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Design, Setup, and Operation of the Fixed- Site TeleEngineering Communications System

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and Bryan Register

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Design, Setup, and Operation of the Fixed-Site TeleEngineering Communications System

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Preface

The work reported herein was funded under the TeleEngineering Operations Technology Demonstration Program, Research, Development, Testing, and Evaluation direct allotted funds, U.S. Army Engineer Research and Development Center (ERDC), Vicksburg, MS. Messrs. Jeffrey L. Williamson, and Carroll J. Smith, Dr. Larry N. Lynch, Geotechnical and Structures Laboratory (GSL), and Mr. Bryan Register, Information Technology Laboratory (ITL), prepared this report.

The work at ERDC was performed under the general supervision of Dr. David W. Pittman, Acting Chief, Engineering Systems and Materials Division (ESMD), GSL, Dr. Albert J. Bush, Chief, ESMD, Dr. Charles R. Welch, Chief, Instrumentation Services and Systems Division, ITL, Mr. Tim Ables, Acting Director, ITL, Dr. William F. Marcuson, Director (retired), GSL, Dr. Michael O'Connor, Director, GSL, and Dr. Bryant Mather, Director Emeritus, GSL.

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1 Introduction

In FY97, the U.S. Army Engineer Research and Development Center (ERDC) initiated a technology demonstration program to determine the feasibility of providing deployed troops with direct access to subject matter experts (SME). Direct access to the SME allows responses to engineering challenges beyond the in-theater capability to be provided without the time delays and costs associated with deploying the SME to the theater.

During the execution of the technology demonstration, the ERDC TeleEngineering Operations Center (TEOC) was established as the main operations center from which TeleEngineering support would be provided to the deployed force. Shortly after the establishment of the TEOC, the U.S. Army Engineer Division, North Atlantic (NAD), requested TeleEngineering support for operations in the Balkans region. In addition to engineer analysis support, the TEOC was requested to develop a method for deployed U.S. Army Corps of Engineers (USACE) personnel to communicate with the U.S. Army Engineer District, Europe (NAU), NAD, and the TEOC. The requirements for the communications equipment were: (a) deployability and (b) the capability to allow secure and nonsecure data transfer, voice, and video teleconferencing (VTC). Additionally, the TEOC was requested to provide a fixed-site TeleEngineering Communications System to be used at NAU, NAD, and the TEOC, in order for personnel at these locations to communicate with deployed personnel. The resulting fixed-site system is based on an Integrated Systems Digital Network (ISDN) and is described herein; the deployable, satellite-based system is described in a separate ERDC report.

The TEOC requested that the ERDC Information Technology Laboratory (ITL) take the lead in developing the communications system. Within a 3-week period, ITL and TEOC personnel researched, designed, procured, validated, and transferred the satellite-based system to NAU for communications with the ISDN-based fixed-site system.

The purpose of this report is to describe the various components of the fixed-site TeleEngineering communications system and to provide the step-by-step procedures required to setup and operate the system. Chapter 2 presents the components that comprise the system. Chapter 3 provides details on setting up the equipment and the interconnections between the individual components. The operation of the system (i.e., conducting a VTC and transferring data) is presented in Chapter 4; methods of receiving technical support are provided in Chapter 5. Appendix A provides a wiring diagram for the fixed-site system.

2 Components of the Fixed-Site System

Overview

The basic components of the fixed-site system (Figure 1) are:

- a. ADTRAN IMUX (modem).
- b. Polycom ViewStation.
- c. Personal computer (PC).
- d. Television (TV).
- e. KIV-7HS encryption device.
- f. Switchbox with cables.

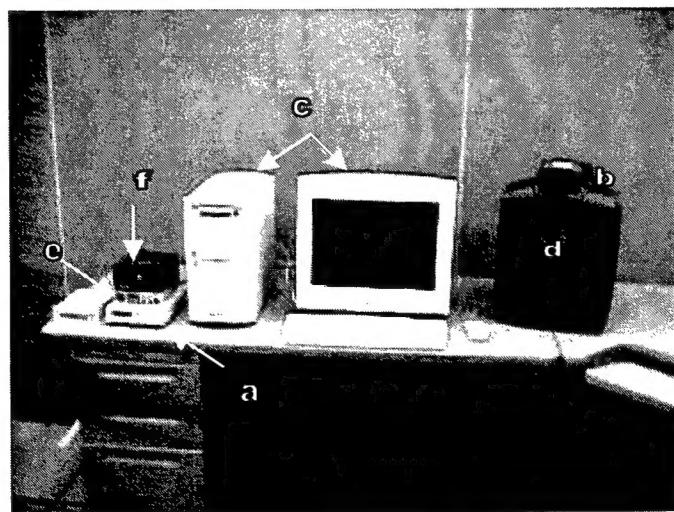


Figure 1. The basic components of the fixed-site system

Each major component of the TeleEngineering fixed-site system is described in one of the following sections.

ADTRAN IMUX

The basic TeleEngineering fixed-site system requires a single ISDN line, which is a switched network based on international standards for digital communications supporting voice, data, and video applications. A single ISDN basic rate interface (BRI) line allows the fixed site to communicate at rates up to 128 kilobits per second (kbps). Faster rates can be obtained by using additional ISDN lines; however, this faster configuration is not discussed in this document. Contact the TEOC for details.

The ADTRAN IMUX (also referred to herein as "ADTRAN" or "IMUX") will serve as the dialing interface for the system and, in many cases, provides the network termination for the ISDN line(s) as well. The specific type of IMUX will vary depending on the type of ISDN line available and the power requirements. A front panel keypad on the ADTRAN supports configuration, test modes, test status, and manual dialing options. Manual dialing is a required feature of the IMUX if the system is to be used with the KIV-7HS encryption device. See Figure 2 for an illustration of an ADTRAN.

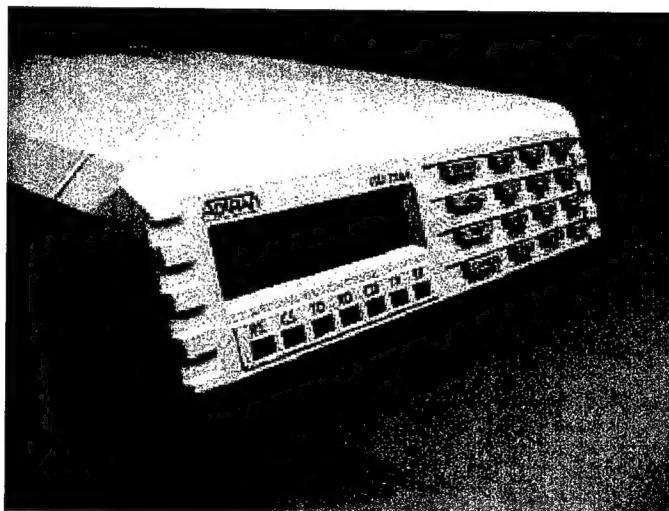


Figure 2. ADTRAN IMUX

Polycom ViewStation

The Polycom ViewStation (Figure 3) is a versatile video conferencing unit that is interoperable with the KIV-7HS encryption device and the ADTRAN. The ViewStation included with the equipment uses V.35 protocol which supports secure communications.

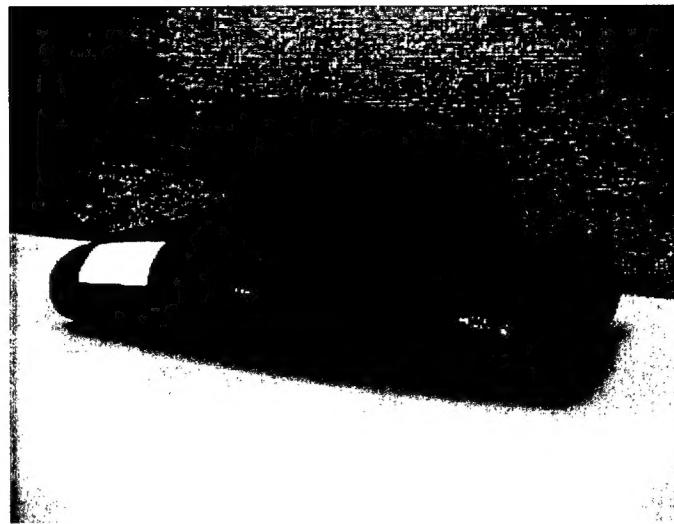


Figure 3. Polycom ViewStation

The ViewStation should be connected to a television via an S-video jack and standard audio jacks or standard audio/video jacks. The plastic housing of the ViewStation is designed to rest on top of a television, as shown in Figure 4.

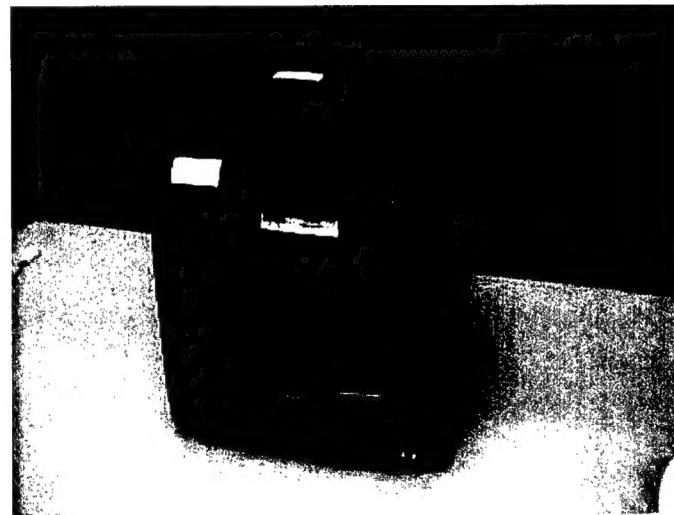


Figure 4. ViewStation resting on a television

Cable connections on the rear of the ViewStation are color-coded to ease the task of connecting it to other equipment.

Television

Standard TV sets with RCA or phonojack video and audio inputs are necessary to display the signal received. Any standard TV will suffice this requirement. Larger TVs may be used for larger conference areas.

Personal Computer

To facilitate secure data communications, a PC is provided with each system. This PC is delivered with two hard disk drives. One hard drive is to be used for classified information; the other used for unclassified, only. Figure 5 provides an example of a PC distributed with the system.

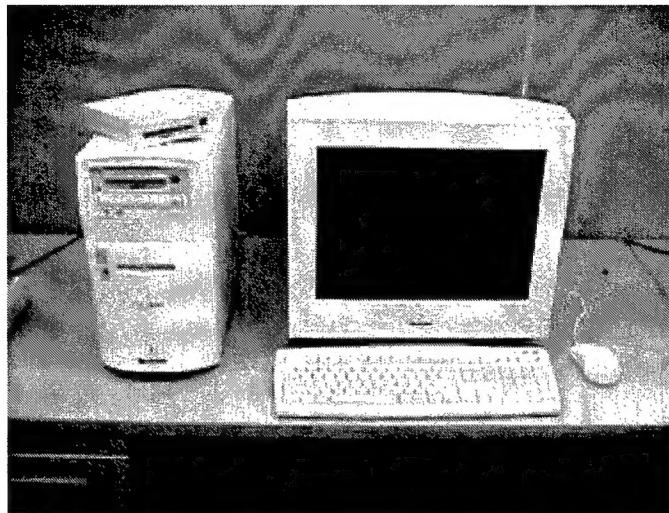


Figure 5. PC with removable hard drive

The PC is equipped with a Comspec ffastests® digital data communications card (also referred to herein as the “Comspec card”). It is installed in an ISA slot and operational upon delivery; no further setup is required.

KIV-7HS (KIV)

The KIV-7HS (commonly referred to as the “KIV”) is a National Security Agency (NSA) certified high-speed encryption device, which enables secure communications. Secure encryption keys must be electronically loaded into the KIV for secure communications. The KIV is produced by Mykotronics and requires a 5VDC power supply provided with the system.

Switchbox and Data Cables

All necessary power cables, power strips, etc. are provided with the system. Data cables enabling communications between the ADTRAN, the KIV, and the ViewStation or PC also are provided. A switchbox is provided to facilitate switching the system between VTC mode and data transfer mode.

3 Setup

Overview

Subsequent sections describe the steps to set up each component and to make the correct cable connections between the components. The setup instructions will begin with the ADTRAN. Appendix A provides a diagram illustrating the interconnections of the components.

ADTRAN

The ADTRAN provided with the CONUS systems is typically a 2×64 version and operates on 110VAC. On the rear of the ADTRAN, there are two data ports, DTE#1 and DTE#2, and an RJ45 ISDN port (Figure 6). Connect the cable with the 37-pin connector on one end to the DTE#2 port; connect the other end of the cable (25-pin connector) to the KIV. Connect the RJ45 cable (ISDN phone cable) to the ISDN port and the other end of the cable to the commercial service port.

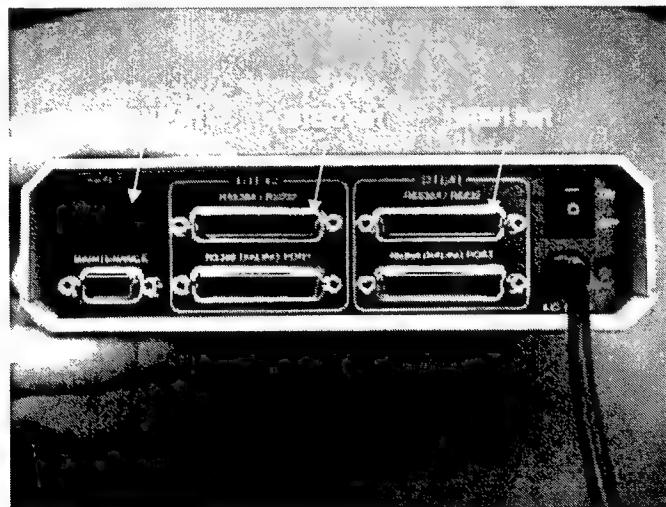


Figure 6. Rear of ADTRAN

TV

The TV provided with the fixed-site system is constructed with the required audio and video inputs. The TV connects directly to the ViewStation via the primary audio/visual (A/V) cable shown in the following illustration (Figure 7).

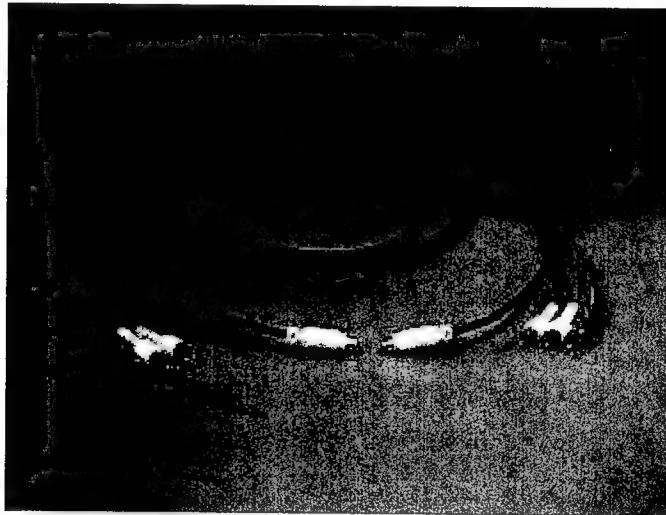


Figure 7. Primary A/V cable

TVs provided with the fixed-site systems vary in style, size, and model and are selected based on specific requirements (i.e., conference room vs smaller room, power requirements, etc.). Connection of the TV will be discussed in the following section.

ViewStation

Place the ViewStation on top of the TV or other suitable location (Figure 8).

The protective foam collar and clear plastic protective lens, both held in place with yellow tape, must be removed from the ViewStation's rotatable camera as shown in Figure 9.

The primary A/V cable (Figure 7) consists of four smaller cables bundled together. The connectors consist of one semiround, yellow S-video connector and three RCA connectors, each colored yellow, white, or red. Plug each of the connectors on one end of the cable into the matching color-coded jacks on the rear of the ViewStation. The four jacks are located to the right of the power jack and they are identified in a single, horizontal row with a white rectangle (Figure 10).

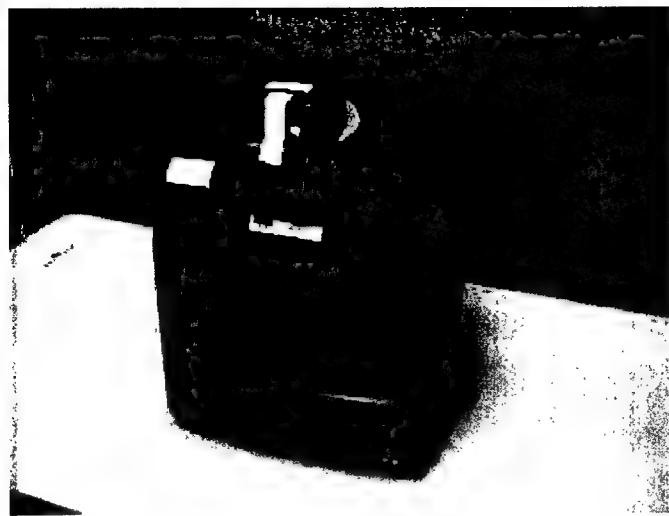


Figure 8. Polycom ViewStation position on TV



Figure 9. Removal of ViewStation's protective packaging

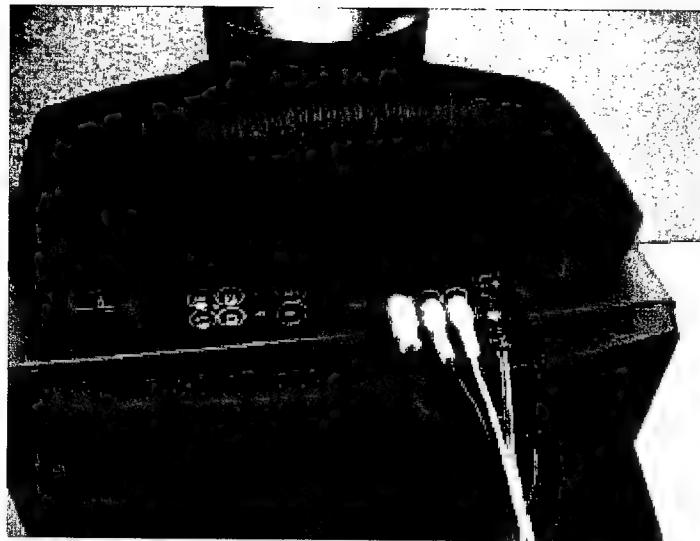


Figure 10. Connection of the primary A/V cable to the ViewStation

Connect the other end of the cable to the color-coded A/V jacks that are located on the TV, as illustrated in Figure 11. (Note: Location of A/V jacks may vary depending on the TV style and model.) At a minimum, it is only necessary to connect two plugs; therefore, yellow plug to yellow jack and white plug to white jack is sufficient, as shown in Figure 12.

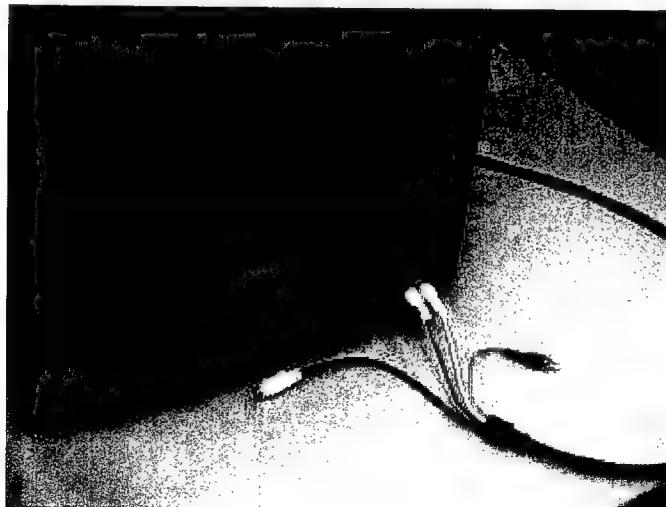


Figure 11. Connection of the primary A/V cable to the TV

Attach the rectangular power supply box (Figure 13) to the rear of the ViewStation as shown in Figure 14. Plug the circular five-pin DIN connector with a flat notch on top into the jack located on the rear center of the ViewStation. Plug the power supply cord on the other end of the power supply box into an AC power outlet. Figure 15 provides an illustration of the power supply.

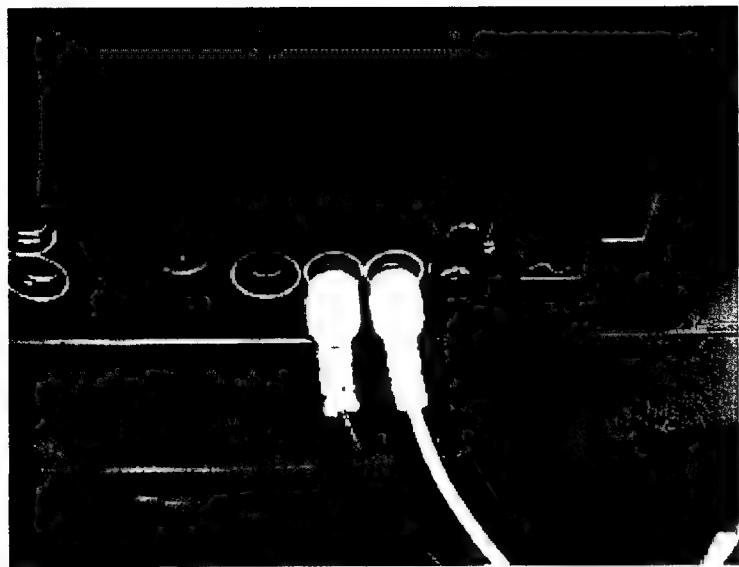


Figure 12. Connection of only two plugs on A/V cable to the ViewStation

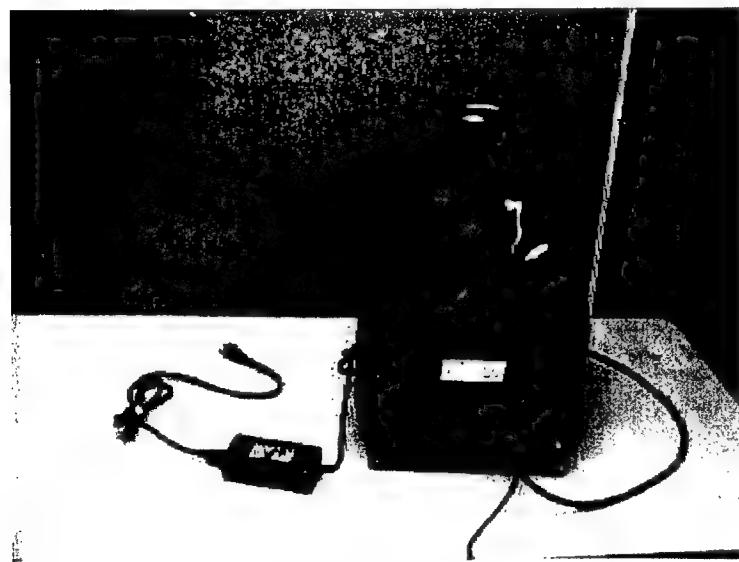


Figure 13. Connection of power supply box to ViewStation

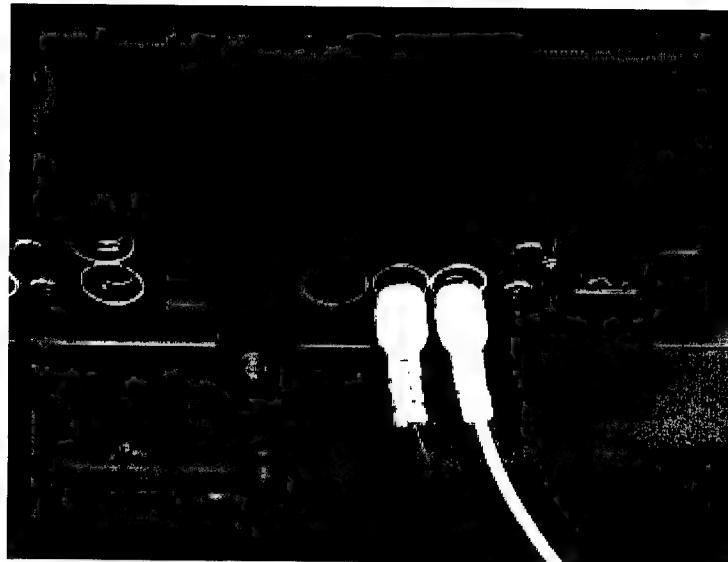


Figure 14. ViewStation power connection



Figure 15. ViewStation power supply

Next, connect the triangular microphone to the ViewStation by inserting the brown color-coded RJ11 connector (similar to a telephone connector) into the brown jack on the rear of the ViewStation as shown in Figure 16. Connect the other end of the cable to the microphone as shown in Figure 17. Figure 18 illustrates the ViewStation connections made thus far.

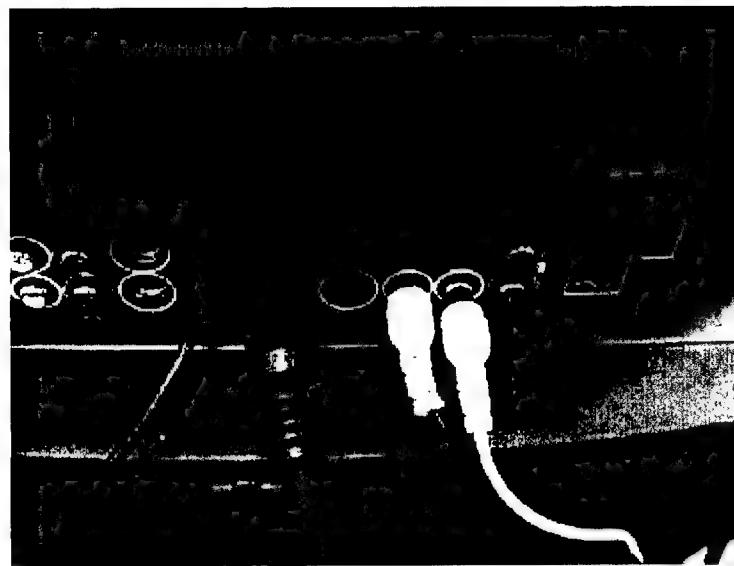


Figure 16. Microphone cable attached to ViewStation



Figure 17. Microphone cable attached to microphone

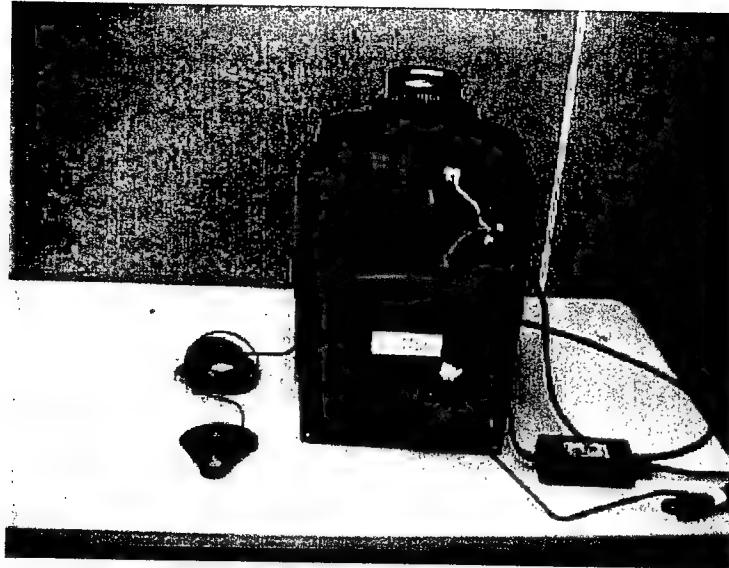


Figure 18. ViewStation with TV, power supply, and microphone attached

Finally, connect the rectangular interface box (Figure 19) to the ViewStation. The interface box cable contains green connectors on each end. Attach one end of the cable into the green color-coded jack on the interface box and the other end of the cable to the green color-coded jack on the rear of the ViewStation as shown in Figure 20. Figure 21 illustrates connections made thus far.



Figure 19. ViewStation rectangular interface box and cabling

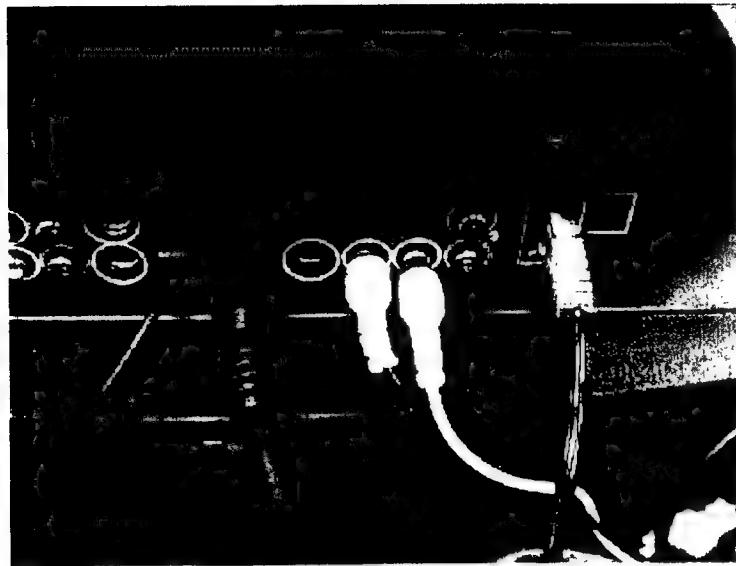


Figure 20. Connection of the ViewStation rectangular interface box

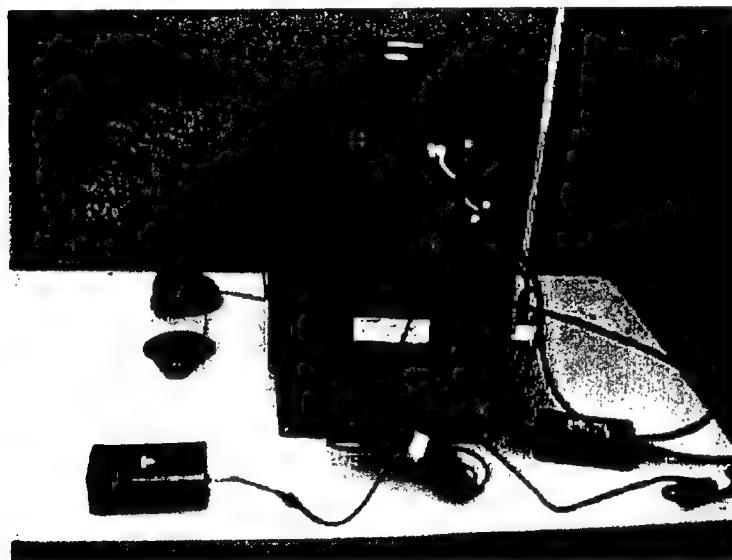


Figure 21. ViewStation, TV, power supply, microphone, and interface box connected

The other end of the interface box contains two 25-pin female connectors. The port labeled "1" connects to the "B" port on the switchbox. More details on the switchbox connection are provided later in this chapter.

The use and operation of the ViewStation's remote control will be presented later in the operation portion of this document.

PowerPoint® slides may be displayed over the ViewStation by connecting a video cable to the input "VCR" jack on the left rear of the ViewStation to the computer (Figure 22).

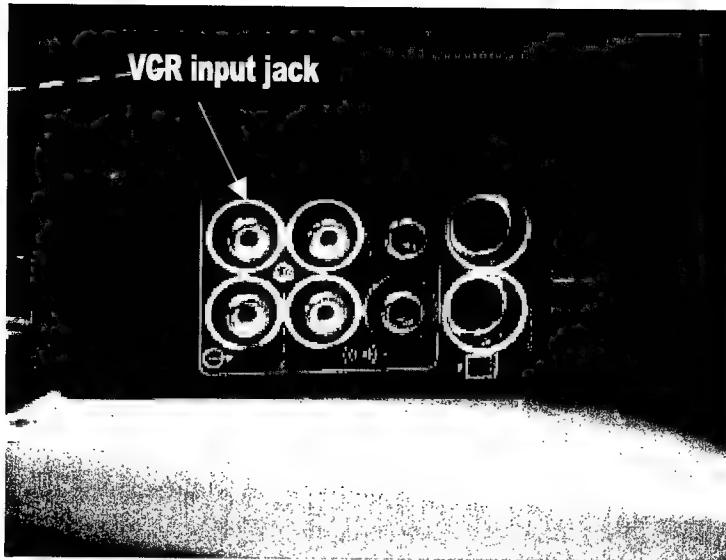


Figure 22. VCR input jack

If the computer is equipped with a video card with an RCA jack, the connection can be made directly. If the computer has only a monitor connector, a scan converter must be used to convert the monitor signal to a video input signal for the ViewStation.

Personal Computer

Place the PC on a sturdy, stable surface large enough to accommodate the PC, keyboard, monitor, and mouse. The PC is delivered with two removable hard drives. It is recommended that one of these drives be preserved for UNCLASSIFIED work, only. Use the other for classified work up to the SECRET level.

A Comspec card is installed in an ISA slot. This card is designed to transmit and receive data in high noise (interference) environments. A cable must be connected from the Comspec card to the switch box. This cable has a 25-pin connector on one end and a 37-pin connector on the other. Connect the 25-pin end to the Comspec card port shown in Figure 23.



Figure 23. Comspec card port on rear of PC

The other end of the cable must be plugged into port “A” of the switchbox as illustrated in Figure 24.

The Comspec card cable actually consists of three cables and two gender changers. One of the cables contains line interface conversion electronics. These cables are delivered connected; however, more details on these connections are provided in the following section.

KIV-7HS, Switchbox, Cables, and Miscellaneous Parts

Figure 25 illustrates the KIV, power supply, switchbox, and data cables.

When handling the KIV, be careful not to accidentally “zeroize” the unit.

1 loaded encryption keys, thus rendering the unit useless for secure communications. The KIV can be “zeroized” by simultaneously pressing two buttons on the front panel. The user should always handle the KIV by the sides of the housing to avoid accidental “zeroizing.”

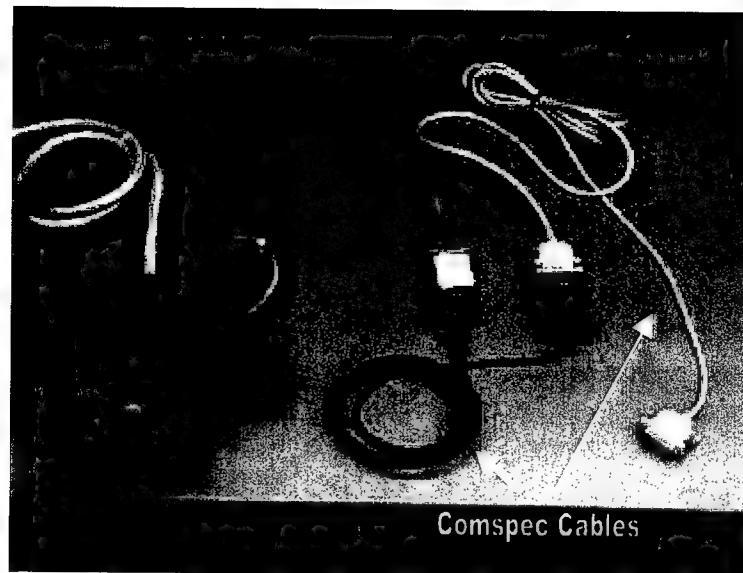


Figure 24. Comspec cable connection to the switchbox

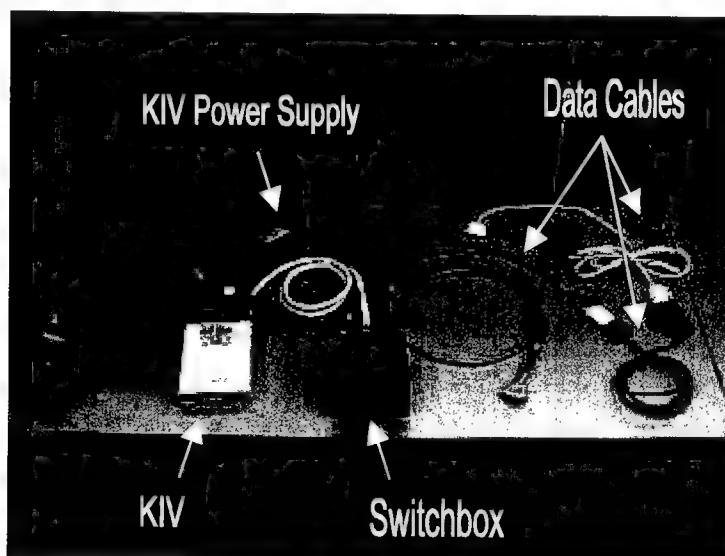


Figure 25. KIV, KIV power supply, switchbox, and data cables

There are four (4) ports located on the rear of the KIV. Three of the ports are labeled from left to right as "Red," "Black," and "Power;" each port accepts a 37-pin male, 37-pin female, and 9-pin female connector, respectively. Connect the KIV power supply to an AC power source. Connect the other end, a 9-pin female connector, into the rear of the KIV at the port labeled "Power" as shown in Figure 26.

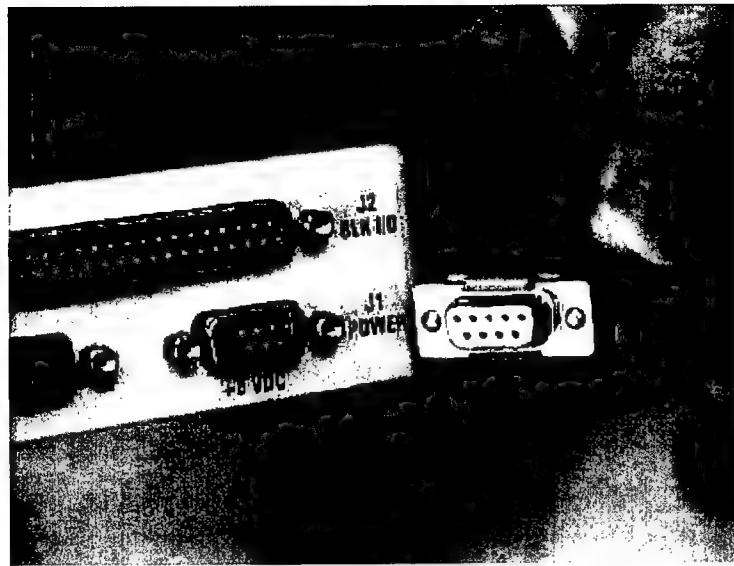


Figure 26. Nine-pin power connection on KIV

The switchbox is used to select either the "VTC" mode or "Data" communications mode. The switchbox contains a two-position selector knob; the positions are labeled "A" (for data) and "B" (for VTC) (Figure 27).



Figure 27. Front of switchbox

There are three (3) ports located on the rear of the switchbox. Each port will accept a 37-pin male connector; the ports are labeled from left to right as B, C, and A.

Typically, three (3) data cables are already attached to the switchbox when the system is delivered. Only connecting the other end of each cable is necessary; however, for clarity, each cable and its connection will be presented in the following paragraphs:

a. Cable 1 connects the switchbox to the Comspec card cables (Figure 28). Cable 1 contains a 37-pin male connector and 25-pin male connector. The 37-pin male connector plugs directly into Port A on the rear of the switchbox. The 25-pin male connector plugs into the line converter, which connects to the Comspec card through the use of gender changers and additional cabling.

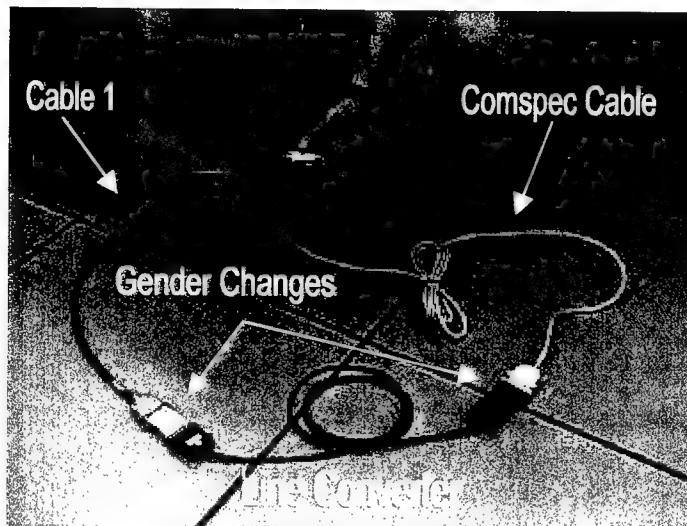


Figure 28. Cable 1 and Comspec card cables

b. Cable 2 consists of a 25-pin male connector and 37-pin male connector (Figure 29). The 37-pin male connector plugs directly into Port B on the rear of the switchbox. The other cable end, a 25-pin male connector, plugs directly into the ViewStation interface box. The box contains two ports; always use Port 1. The opposite end of the interface box has a green jack, which has already been connected to the ViewStation in earlier steps of this setup.

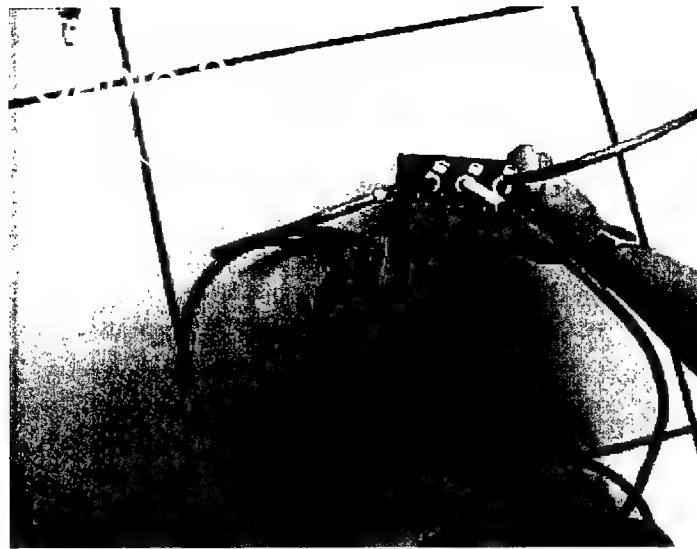


Figure 29. Cable 2

- c. Cable 3 contains a 37-pin male connector on each end (Figure 30). One 37-pin male connector plugs directly into Port C on the rear of the switchbox; the other end, a 37-pin male connector, connects directly into the KIV Red Port located on the rear of the KIV. Always handle the KIV by the sides to avoid accidental "zeroizing."

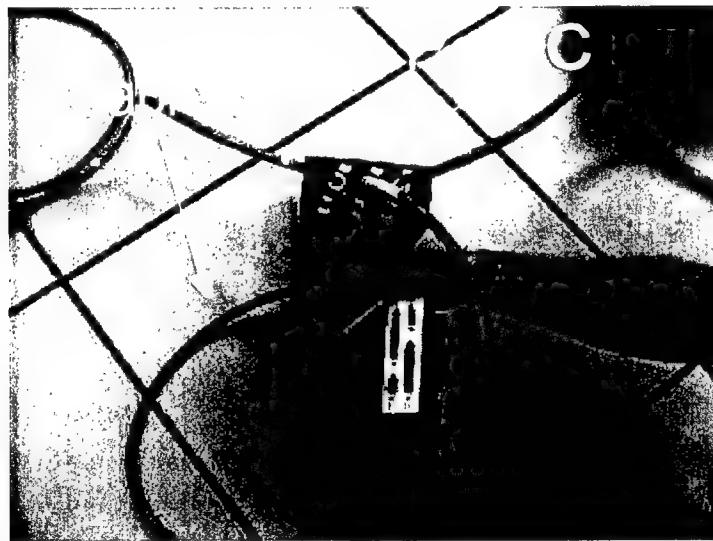


Figure 30. Cable 3

- d. Cable 4 contains a 25-pin male connector and 37-pin female connector (Figure 31). The 37-pin female connector plugs directly into the KIV Black Port on the rear of the KIV. The 25-pin male connector plugs directly into the rear port of the ADTRAN into port DTE #2. Using a screwdriver, secure all cables.

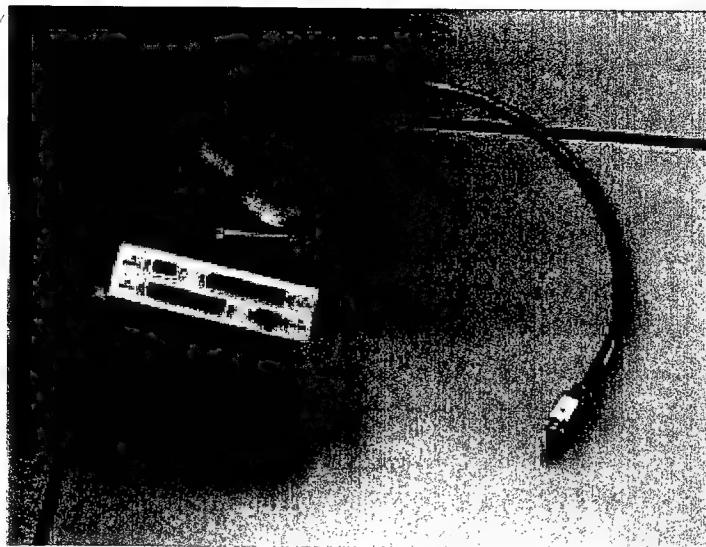


Figure 31. Cable 4

Refer to Figure 1 for an illustration of the final setup of the fixed-site system.

4 Operation of the System

The following two sections will provide instructions on the operation of the TeleEngineering communication systems.

Conducting a VTC

To initiate a secure VTC, ensure the switchbox selector knob is positioned to VTC or "B." Power the ViewStation by positioning the rocker switch on the right rear side (looking from the rear) of the ViewStation to the "1" position. Turn on the TV and ensure the channel (input) selection mode is "INPUT." A start screen similar to the one in Figure 32 should appear on the TV.

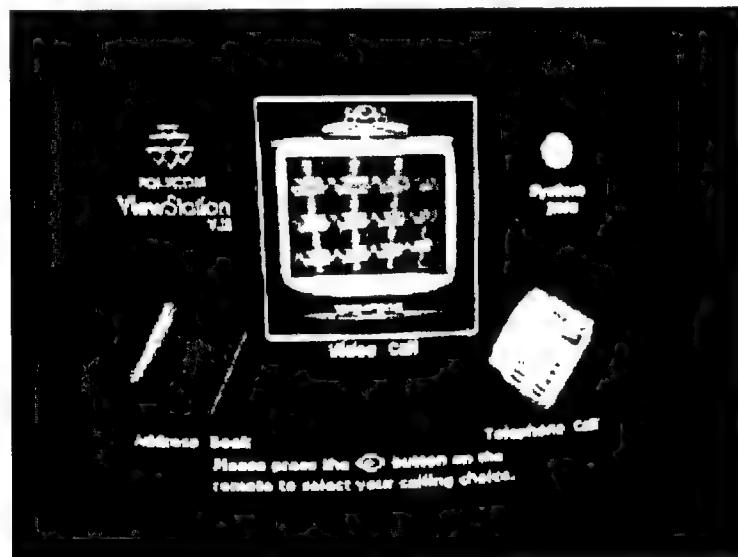


Figure 32. Start screen

Various functions of the TV and ViewStation can be controlled with the remote control (Figure 33).

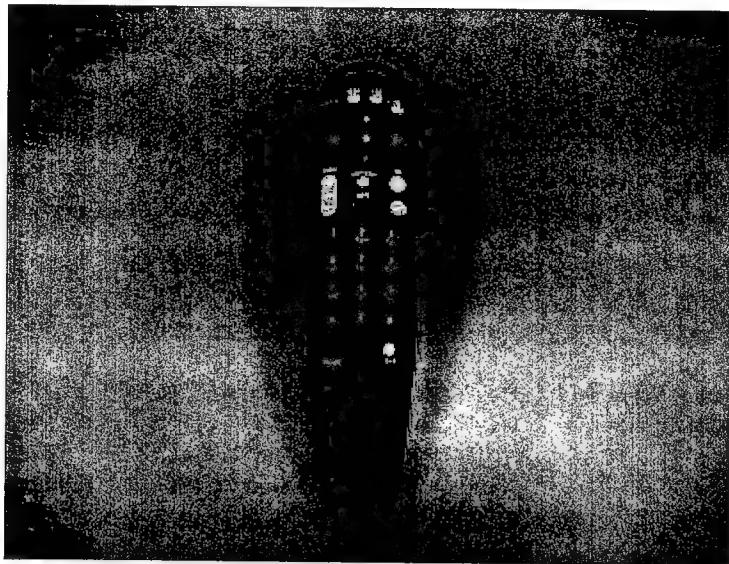


Figure 33. ViewStation remote control

Some of the more commonly used keys on the remote control are:

- a. *Volume key.* Located on the right side, increases or decreases the audio output of the ViewStation.
- b. *Green key.* Located at the top of the remote control; selects from a start screen to a full screen and vice versa. Prior to conducting a VTC conference call, this key can be used to select a full screen, which activates the ViewStation to display the view from the ViewStation's camera.
- c. *Red arrow keys.* Located near the top of the remote control after a full screen has been activated, the keys can be used to rotate the ViewStation camera to obtain a desired view.
- d. *Zoom key.* Located on the left side and is used to "zoom" the ViewStation camera.

Ensure that the KIV is connected properly. A crypto ignition key (CIK) is supplied with each KIV, which will activate that unit, only. Figure 34 provides an illustration of a CIK.

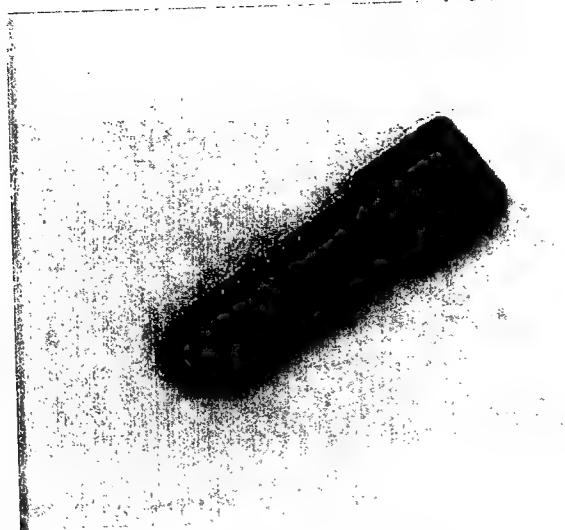


Figure 34. Crypto Ignition Key (CIK)

Turn on the ADTRAN; the display should indicate a ready message, depending on your nationality of service.

Insert the CIK into the slot located on the right front side of the KIV and turn the CIK clockwise one-quarter turn to the right to the horizontal position as shown in Figure 35.

The KIV will "beep" and messages will appear on the KIV display; messages appearing are as follows: "Testing," "Batt Good," "Key Good," and finally, "FDX." After the FDX message appears and remains in the FDX mode, the Online button will flash, indicating the system is ready for a secure call. If the call is nonsecure, the KIV must be completely removed from the system by unplugging



Figure 35. KIV with CIK inserted and turned to horizontal position

the two cables connected to the RED and BLACK ports of the KIV, and plugging the two connectors together.

On the ADTRAN front panel, press “#” to display the dialing screen. If DTE#1 is flashing, use the “up” arrow to select DTE#2. (Note: These instructions assume that DTE#2 is in use, as directed in Chapter 3. If the KIV cable is connected to DTE#1, then DTE#1 should be selected.) Once DTE#2 is flashing, press Enter. Press “2,” then press Enter to bring up the display, which reads “Dial Number.” Enter the ISDN number; for example, to connect to the TEOC bridge from within the U.S., enter “16016343981” and press Enter. Dial numbers will vary, based on the ADTRAN display, and will read “Dialing,” “Connect Bonding Setup,” followed by “Bonding 128K.” (When connecting to a deployable system, the display will read “Clear Channel.”)

When the display reads “Bonding 128K,” (or “Clear Channel, “if connecting to a deployable system) press the green button near the top of the Viewstation remote control. The ADTRAN’s TD and RD lights should flash. The KIV will beep twice and the On-line light will turn solid; the display will read “FDX TR.” The VTC will finalize its connection.

To terminate communications, press the “#” key to bring up the dialing screen. Ensure DTE#2 is flashing, then press Enter. Press Enter again to “hang-up” call. The display will present a ready message.

If the system is set up to display PowerPoint® slides, while the system is in a call, press the “near” key on the ViewStation remote and select t for input from the computer.

Transferring Data

The following paragraphs provide instructions on transferring and receiving files to/from other sites.

Ensure the ADTRAN is turned “on.” The display should present either a ready message or “Deactivated.” Ensure the appropriate hard drive is installed in the TeleEngineering data computer. If classified material will be exchanged, ensure the secure hard drive is installed. The computer must be disconnected from all other networks. The hard drive may be interchanged by simply removing (unlock with key and pull out) and inserting the other drive (push in and lock with key). Hard drives may be swapped only when the computer is “off.”

Ensure the switchbox is set to “DATA” or “A.” For secure communications up to the SECRET level, insert the CIK into the KIV and turn clockwise one-quarter turn until the unit powers up. The display should read “FDX,” and the On-line indicator should be flashing.

For nonsecure communications, the KIV is not needed. Simply remove the two 37-pin connectors attached to the rear of the KIV and plug them together.

Prior to activating the Comspec ffastests® software, decide whether your system will be the “sender” or “receiver.” This will require coordination with the other station. Typically, the deployable satellite-based stations are senders and the ISDN-line based fixed-site stations are receivers. If two fixed sites need to exchange data, one must be a sender and the other must be a receiver.

Place files to be transferred into the appropriate directory by using Windows Explorer® and the “copy” and “paste” techniques. If you are the sender, place the files in the C:\XMIT\SEND directory. If you are the receiver, and you want senders to “auto-receive” files, place them in the directory corresponding to the user ID assigned to the appropriate recipient. Examples of the user directories are:

C:\XMIT\TEOC,
C:\XMIT\NAU,
C:\XMIT\NAU-F1,
C:\XMIT\DCSENG,
C:\XMIT\NAD, or
C:\XMIT\USERID

For the other site to receive files stored in one of these directories, the caller must use the directory name as the user ID "TEOC," "NAU," "NAU-F1," "DCSENG," "NAD," or "USERID," respectively. "USERID" is the default user ID name used by the software.

To activate the Comspec ffastests® software, double-click the yellow icon located on the Windows Desktop®, as illustrated in Figure 36. This icon may be titled “PC-GOV” or “ffastests PC.”



Figure 36. Desktop screen

Click the “Configure” menu item at the top of the screen, as Figure 37 illustrates.



Figure 37. Configuring ffastests PC software

Some users may have the option of choosing “PC-SEND” or “PC-RECEIVE.” These are preconfigured versions of the software which will load automatically. Once started, the program can be accessed by clicking the bar (labeled “ffastestsPC – HSD”) at the bottom of the Windows Screen. This will maximize the status screen. If necessary, the user can go back to the Configure screen by clicking on the “Exit” button.

If you are the receiver, click the “RECEIVE” option under “TRANSFER MODE.” A specific receive directory can be specified by clicking “Yes” under the “Specific Receive Directory Box” and entering the name of the desired receive directory (example: “C:\xmitrcv”). If you click “no,” the files will be placed in the directory “from where they came,” specified by the sender. It is recommended that the defaults be accepted for all other options.

Click the “Establish Communications” button, as Figure 38 illustrates.

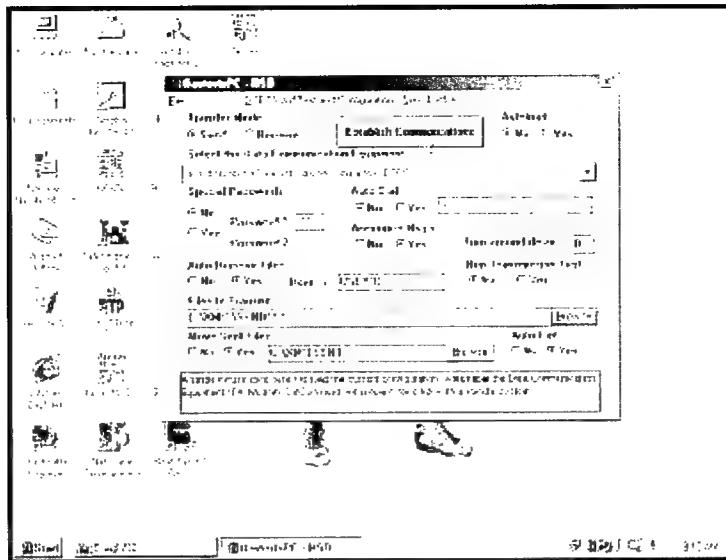


Figure 38. Establishing communications

A new window will open and text will appear on the screen. The last line should read, "Waiting for link."

If you are the sender, click the "send" option under "TRANSFER MODE," as illustrated in Figure 39.

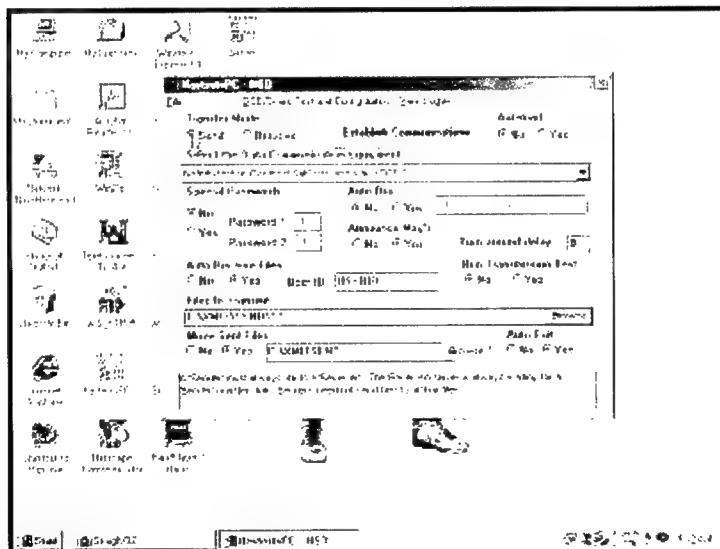


Figure 39. Activating "send" mode

Under "Auto Receive Files," click "yes" and enter your user ID. "USERID" is the default ID, but you may want to use your assigned name (For example: NAU, NAD, NAU-F1, DCSENG, POD, POA, POF, etc.). This will allow you to receive files from the far site. If you click "no," you will receive none of the files the far site may have waiting for you. The files on the far site must be stored in

the assigned directory as discussed in previous paragraphs. It is recommended that the defaults be accepted for all other options.

Click the “Establish Communications” button, as Figure 40 illustrates.

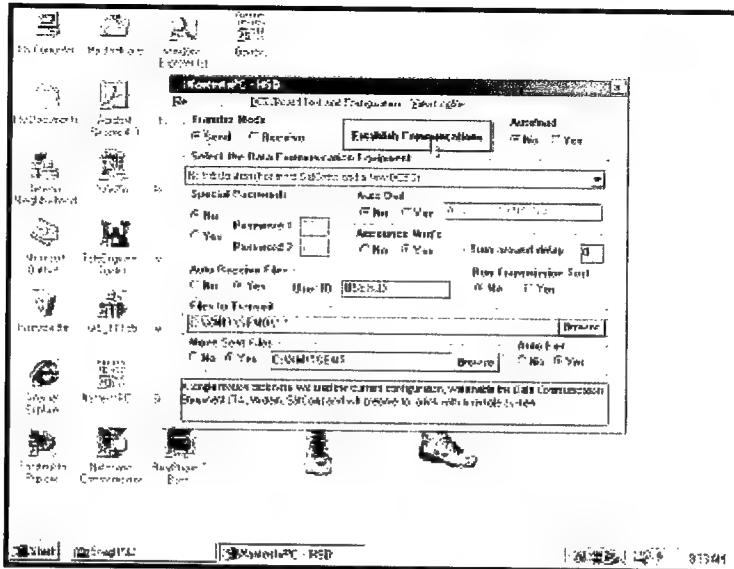


Figure 40. Establishing communications

A new window will open and text will appear on the screen. The last line should read, "Trying to establish link," as illustrated in Figure 41.

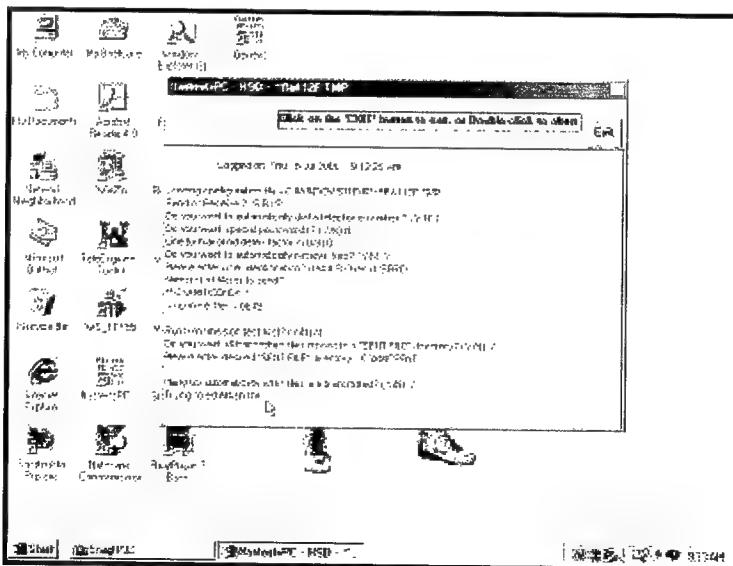


Figure 41. “Trying to establish link” window

If you are the receiver, simply wait for a call. Once you are contacted by the other station, your ADTRAN will display "Bonding 128K" on the screen.

If you are using your KIV, it should synchronize with the other station. You will hear two beeps; the screen should display "Remote link established with F F A S T S T S P C H S D."

The file transfer exchange will begin. Upon completion, the software will return to a "Waiting for Link" mode.

At any time, you may click on the "Exit" button to return to the "Configure" screen. To check the log file, click on the "View Logfile" menu item. The log file contains a list of all software activity, which shows when the system was last used, which files were exchanged, and where they are stored.

If you are the sender, you must place the call to the other station using the front panel keypad on your ADTRAN. The following instructions assume DTE#1 port is used on the ADTRAN, i.e., the DTE#1 port on the rear of the ADTRAN will have a cable connected.

Press the "#" key; DTE#1 will flash. If DTE#2 is the port in use, press the "up" arrow on front of the ADTRAN; DTE#2 will flash. Press Enter and then press "2." Select this option by pressing Enter. A blinking cursor will appear, prompting for input of the number. Enter the number and press Enter.

Once you are connected to the other station, your ADTRAN will display "Bonding 128K" or "CLEAR CHANNEL 64000." The KIV should synchronize with the other station; you will hear two beeps. Next, the screen will display "Remote link established – with F F A S T S T S P C H S D."

The file transfer exchange will begin. Upon completion of the file transfer, the software will terminate and return to the "CONFIGURE" screen. Next, you must manually terminate the call; otherwise, you will incur unnecessary ISDN charges for prolonged connections. To hang up the call, press the "#" key. If DTE#2 is the port in use, press the "up" arrow and press Enter. Select "Hang-up" and press Enter.

At any time, you may click on the "exit" button to return to the "Configure" screen. From the "Configure" screen, you may want to check the log file by clicking on the "View Logfile" menu item.

If the system loses ISDN line or satellite signal during transmission, only a portion of a file may be transmitted. The software is designed to complete the transmission on the next call. Simply reestablish communications and redial the call via the ADTRAN.

5 Getting Technical Support

If you need support, contact the TEOC at one of the following numbers:

1-877-223-8322 (toll free within U.S.)
(601) 634-3485 (Commercial)
(601) 634-2735 (Commercial)
(312) 446-3485 (DSN)
(312) 446-2735 (DSN)

TEOC personnel respond to the voice mail associated with these numbers 24 hours a day, 7 days a week. Every reasonable effort will be made to assist you.

Questions may be emailed to the TEOC at:

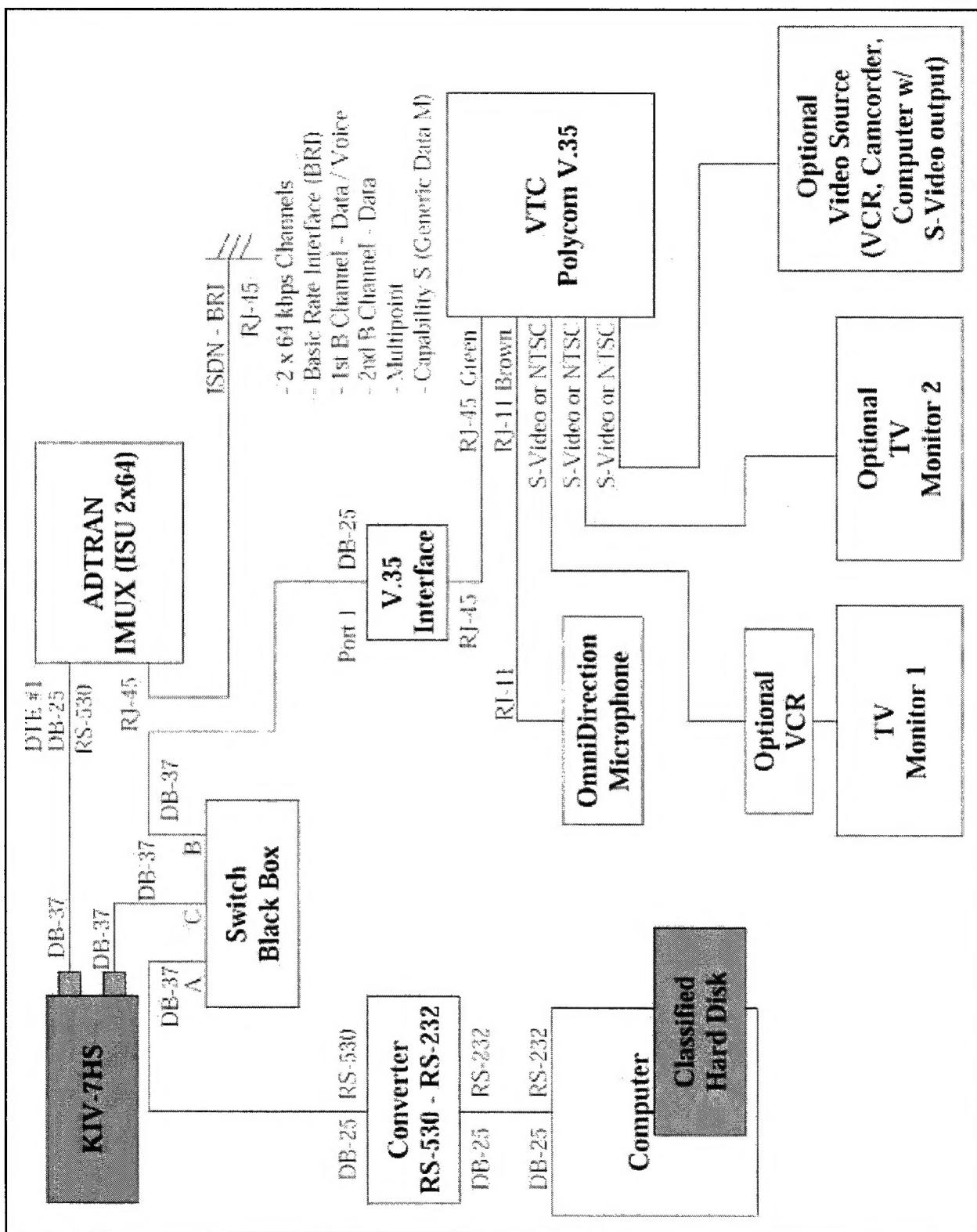
Teoc@teleengineering.usace.army.mil (nonsecure)
Teoc@teleengineering.army.smil.mil (secure)

You may visit our websites at:

http://teleengineering.usace.army.mil (nonsecure)
http://teleengineering.army.smil.mil (secure)

Appendix A

TeleEngineering Fixed-Site Setup Diagram



REPORT DOCUMENTATION PAGE

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14. ABSTRACT In FY97, the U.S. Army Engineer Research and Development initiated a technology demonstration program to determine the feasibility of providing deployed troops with direct access to subject matter experts (SME). Direct Access to the SME allows responses to engineering challenges beyond the in-theater capability to be provided without the time delays and costs associated with deploying the SME to the theater. The purpose of this report is to describe the various components of the fixed-site TeleEngineering communications system and to provide the step-by-step procedures required to set up and operate the system. Chapter 2 presents the components that comprise the system. Chapter 3 provides details on setting up the equipment and the interconnections between the individual components. The operation of the system (i.e., conducting a VTC and transferring data) is presented in Chapter 4; methods of receiving technical support are provided in Chapter 5. Appendix A provides a wiring diagram for the fixed-site system.				
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